Plotting the Oceans:
Dutch Sea Atlases of the Seventeenth Century

exhibition and text by Anne Dondertman

on display at the Thomas Fisher Rare Book Library,

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The sea chart documents the evolution of Europe's knowledge of the world outside its borders. Restricted at first to the coastlines of the Mediterranean, then moving outward to the coasts of northern Europe and Africa, the charts bear witness to an expanding world. The making of these detailed sea charts depended on the ability to gather navigational information. Consequently the maritime power of the day also dominated in mapmaking, and the charts can be seen as an expression of both the geography and the politics of their time. Between 1400 and 1900 the centres of power, and of chart production, moved first from the Mediterranean states of Italy, Portugal and Spain, to the Low Countries, and then later to England and France.

The first great work launching Dutch supremacy in the production of sea charts was Waghenaer's *Spieghel der Zeevaert* of 1584. It remained the prototype for over two centuries, so much so that atlases of sea charts were referred to generically in England as 'waggoners'. This exhibition focuses on two examples from the golden age of Dutch cartography in the following century - the 1666 sea atlas of Hendrik Doncker (1626-1699) and the 1686 sea atlas of Jacobus Robijn (d. ca. 1710). The first two cases set the stage by giving some background and context for the emergence of the Dutch sea chart industry; the remaining cases display examples of charts from the Doncker and Robijn atlases.

Vignette depicting one of the four elements, *Aqua*, from the double hemisphere world map by F. DeWit in Donker's *Zee - Atlas* (Amsterdam, 1660)

CASE ONE: *In the Beginning : The Mediterranean World View*

World map from Hartmann Schedel (1440-1514). *Liber Chronicarum*. Nuremberg: Anton Koberger, 1493.
Double-page woodcut on paper, 31 × 43 cm.

The *Liber Chronicarum*, or *Nuremberg Chronicle*, as it is familiarly known, records the history of the world from the creation to the year 1493, when it was produced by the master printer Anton Koberger. It is considered one of the greatest works of graphic art in the early period of printing. The woodcut map, like the hundreds of other illustrations and views in this volume, is the work of Michael Wolgemut and his stepson, Wilhelm Playdenwurff. The world map is primarily decorative, encircled by images of the twelve winds, and with the three sons of Noah upholding the corners. In the border at the left are depictions of fantastic monsters derived from medieval travel tales. In common with other world maps of antiquity and the early middle ages, it is chiefly an expression of a theological or philosophical view of the world, rather than an attempt at scientific observation intended as an actual guide to exploration or navigation.

Chart of Peninsular Europe from Portolan Atlas. [Venice? : second half of the 16th century]
Hand-coloured MS chart on vellum, 58 × 38 cm.
On loan from a private collection.

Co-existing with the medieval *mappamundi* was the manuscript sea chart tradition, with its practical rather than theoretical view of the known world. Coastal charts on vellum are extant from the end of the 13th century, but were in use from a much earlier period, and evidently derived from *portolano* or written forms of sailing directions. This example is typical of the manuscript charts drawn anywhere in the Mediterranean well into the 17th century. It is overlaid with a system of coloured rhumbs, a network of direction lines emanating from windroses showing the winds, or points of the compass, that enabled the navigator to steer a course. Very little interior detail is shown, but the exaggerated depiction of bays results in a scalloped coastline. Place-names are written in black and red continuously round the coasts at right angles, so the chart has to be rotated to read them in sequence. Stippling and small crosses are used to indicate hazardous shoal water and rocks. The charts were projectionless, but in this late 16th century example vertical grid lines and lines of latitude are shown, and a scale bar appears in the corners although no value is indicated. The stylized, conventional format of these Mediterranean charts endured for a period of approximately 400 years between the 13th and 17th centuries, although their content was continuously updated as information gathered on the latest discoveries was incorporated. These manuscript charts were the direct antecedents of the more scientifically accurate and detailed sea charts produced in Holland in the 17th and 18th centuries.

This example demonstrates one way in which a number of these charts could be bound together into an atlas format. The individual charts have been cut up and mounted on both sides of thick paste-board, which folds into leather covers. Although portolan charts were primarily intended for the use of mariners on board their ships, and thus had a utilitarian purpose, there was also a demand for richly embellished versions among the wealthy. This example, in very fine condition, with its attractive decoration and colouring and elaborate binding, may have been intended for such a market.

Maris Pacifici, dated 1589 from Abraham Ortelius (1527-1598). *Theatrum Orbis Terrarum*. Antwerp: Ex Officina Plantiniana, 1595, showing Magellan's ship dominating the Pacific Ocean.
Double-page engraved map on paper, 34 × 49 cm.

The pre-eminence of Spanish and Portuguese mariners in the 15th and 16th centuries is dramatically depicted in this map, which shows Magellan's ship the *Victoria* dominating the Pacific Ocean. From the mid-15th century the progressive stages of discovery from Cape Bojador to China, and from Labrador to the Straits of Magellan, were immediately and directly reflected in the maps and charts of the day. As exploration expanded, information was brought back and incorporated into portolan charts, resulting in a number of charts of areas never previously mapped. Magellan's circumnavigation of the globe in 1522 inaugurated a new era in mapmaking and in navigation. By the 1520s the great Portuguese cartographers, such as Diego Ribeiro, had succeeded in compiling an accurate outline of both the eastern and western hemispheres. As mariners undertook long ocean voyages in unfamiliar waters, they needed to rely increasingly on their charts, and it became clear that something better than the manuscript portolan was required. The very different demands of ocean as opposed to coastal navigation necessitated changes in navigational aids and instruments, as well as in cartography. The focus of European mapmaking was soon to shift away from the Mediterranean manuscript tradition to the improved technology and commercial maritime power of the newly formed Dutch Republic.

Indiae Orientalis Insularumque Adiacientium Typus from Abraham Ortelius (1527-1598). *Theatrum Orbis Terrarum.* Antwerp: Christopher Plantin, 1584.
Double-page engraved map on paper, hand-coloured, 35 × 55 cm.

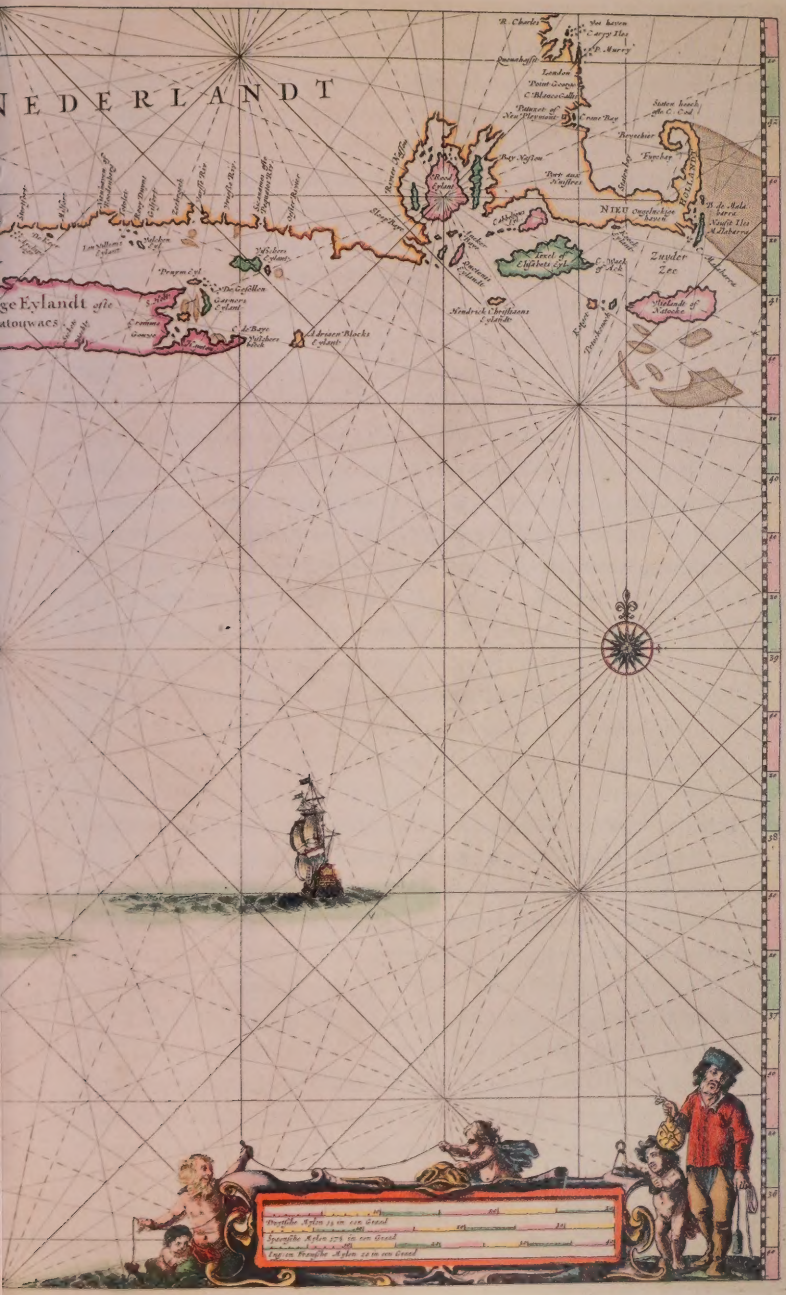
Increased shipping activity and trade inevitably led to a growing demand for accurate guides and charts. The technical advances in printing and engraving techniques of the 16th century made possible the publication of many finely detailed copies of a map plate. Although a few maps in the 15th century were produced by copper engraving, most printed maps to this time had been woodcuts and it was not possible to achieve the fine detail needed for accurate mapping. In this context, the publication of Ortelius's *Theatrum* in 1570, generally referred to as the first true land atlas, and thus a momentous event in the history of cartography, was also a significant landmark in the history of map printing and publishing. The copper plates were finely engraved by Franz Hogenberg (1558-1590) and carefully printed - the 1584 edition on display being printed at the Plantin Press. From this time, copper engraving remained the primary method of producing maps until the advent of photolithography in the 1920s. The Ortelius atlas was also significant in the history of map publishing for it was an immediate success and went into many editions, including French, German, Italian and English. Following the success of the Ortelius atlas the Netherlands quickly took the lead in publishing sea charts as well as land maps, and 1584 saw the publication of the first edition of Waghenaer's *Spieghel der Zeevaert*, the direct precursor of the many fine Dutch sea atlases to come.

The map of the East Indies on display is one of the original 53 maps of the first edition of 1570. It is a close copy of Mercator's 1569 world map. Not surprisingly, in view of the fact that much of the area was still unexplored, the map is full of error. Sea monsters and mermaids dominate the *Oceanus Orientalis* at the upper right. This area was not to be accurately mapped for another two centuries.

Portrait of Mercator from Gerhard Mercator (1512-1594). *Atlas sive Cosmographicae.* Duisburgi Cl[ivorum: F. and Rm Mercator, 1602]
Engraved portrait on paper, hand-coloured, 20 × 15 cm.

Mercator was not only the greatest geographer of the 16th century, but he was also a superb engraver, calligrapher and scientific-instrument maker. His development of what we now know as the Mercator projection was impelled by a practical desire to produce useful navigational charts for seamen. In his projection the meridians are equally spaced, parallel vertical lines, and the lines of latitude are parallel horizontal straight lines, which are spaced farther and farther apart as their distance from the Equator increases. By this device, mariners are enabled to steer a course over long distances by plotting straight lines, which cut all the meridians at the same angle. Mercator's renowned 1569 world map was

Pas caerte van Nieu Nederlandt en de Engelsche Virginies van Cabo Cod tot Cabo Canrick from J. Robijn's *Zee, Zea - Atlas - Aquatique, del Mar* (Amsterdam, 1686).


NEDERLANDT
Nieu Zeelandt
Zuyder Zee
NIEU Ongelucksen bosch
Nieu Vlieland
Texel
Vlieter
Schelling
Ameland
Schiermonnikoog
Rottumer Plat
Rottum
Borkum
Emden
Delfzijl
Lauwers Zee
Groningen
Dokkum
Harlingen
Stavoren
Enkhuysen
Medemblick
Hoorn
Monnickendam
Edam
Purmerende
Zaandam
Amsterdam
Muyden
Weesp
Naerden
Gooylandt
Utrecht
Amersfoort
Elburg
Harderwijck
Arnhem
Nimmegen
Tiel
Bommel
Gorcum
Dordrecht
Rotterdam
Delft
Leyden
Haerlem
Alckmaer
Medemblick
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Elburg
Harderwijck
Arnhem
Nimmegen
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Bommel
Gorcum
Dordrecht
Rotterdam
Delft
Leyden
Haerlem
Alckmaer
Texel
Vlieter
Schelling
Ameland
Schiermonnikoog
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Emden
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Lauwers Zee
Groningen
Dokkum
Harlingen
Stavoren
Enkhuysen
Hoorn
Edam
Zaandam
Amsterdam
Muyden
Weesp
Naerden
Gooylandt
Utrecht

constructed on this principle, but was at first little understood or appreciated. It was an Englishman, Edward Wright (1558?-1615), who explained the theoretical and mathematical basis of the projection some thirty years later, but a considerable time elapsed before it was generally applied to sea charts, which continued to be plotted on a plane projection until late in the 17th century.

This portrait of Mercator with a globe and pair of compasses appears at the beginning of his great atlas along with a brief biography. Only the first two parts of the atlas were finished by the time of Mercator's death, and the complete work, in three volumes, was not issued until 1595 by his son Rumold Mercator. This is the 1602 edition published in Germany, just before the copper plates were sold by Mercator's heirs to Jodocus Hondius in Amsterdam.

Improvement in practical navigation and chart-making depended on improved instrumentation, as well as the requisite level of scientific knowledge on the part of mariners to enable them to take advantage of technological improvements. The importance of celestial navigation increased as coastal sailing was replaced by voyages across large bodies of uncharted water. Improvements in instrumentation, afforded by the compass, astrolable, cross-staff and back-staff, were designed to provide a more accurate determination of latitude. A fairly sophisticated understanding of mathematics was essential in making the required astronomical calculations on board ship. General guides to navigation were also published in great numbers, along with pilot books.
Several significant English works of the period are shown:

Edmund Gunter (1581-1626). *The Description and Use of the Sector, Crosse-staffe, and other Instruments.* 2nd ed. London: William Jones, for James Bowler, 1636.
Gunter, a mathematician, wrote on various instruments associated with navigation. The work is open at the description and illustration of his recent invention of a small portable quadrant.

Arthur Hopton (1588?-1614). *Speculum Topographicum, or, The Topographicall Glasse.* London: Printed by N. Okes for S. Waterson, 1611.
Hopton was an astrologer and compiler of almanacs and prognostications. In this work he provides many helpful practical rules for geometry, measurement of distances and heights, and the sun's altitude and parallax.

John Napier (1550-1617). *Mirifici Logarithmorum Canonis Constructio.* Lugduni: Apud Bartholomaeum Vincentium, 1620.
Napier, renowned as the inventor of logarithms, recognized the need to simplify the immensely complicated mathematical methods needed for astronomical calculations, which in turn were essential for navigation. In this work, which first appeared posthumously, he explains how he calculated his tables of logarithms.

William Oughtred (1575-1660). *The Circles of Proportion and the Horizontall Instrument.* Oxford: Printed by W. Hall for R. David, 1660.
This is a classic treatise on navigation written by one of the foremost mathematicians of the age. In the section on display he refers briefly to the problem of accurately calculating longitude: "the longitude ... is the difficultie, and Master-piece of Nauticall Science : which hath set on worke the wits and inventions of many men ..." The accurate determination of longitude on board ship was not to come until the invention of the marine chronometer by John Harrison a century later.

Peter Perkins. *The Seaman's Tutor.* London: O. Blagrave, 1682.
As the extended title makes clear, this work covers all aspects of practical navigation: "geometry, cosmography, and trigonometry. With requisite tables of longitude and latitude of sea-ports, traverse tables, tables of easting and westing, meridian miles, declinations, amplitudes, refractions, use of the compass, kalendar, measure of the earth's globe, use of instruments and charts, difference of sailing, estimation of a ship's way by the log, and long-line, currents, &c." The work is open at a plate of the "quadrant", actually an illustration of the workings of the back-staff, a late 16th century improvement on the cross-staff, used for taking altitudes at sea.

CASES THREE TO EIGHT: Plates from Doncker's *Zee-Atlas*, 1660 and Robijn's *Zee, Zea - Atlas - Aquatique, del Mar*, 1686.

Holland is justly celebrated for its sea atlases. The publication of Waghenaer's *Spieghel der Zeevaert* in 1584 marked an exceptional achievement in nautical cartography. Only a handful of printed sea charts exist for the period prior to 1580, as the scale had been too small, and the hydrographic detail insufficient to meet the needs of pilotage. Although printed texts of sailing directions existed at this time, much of the hydrographic information incorporated by Waghenaer had never been published, and certainly had not been expressed graphically on a chart. He standardized the symbols for navigation aids, such as buoys, beacons and landmarks, and for hazards such as shoals and submerged rocks. Like Ortelius, Waghenaer drew his data from many sources, both manuscript and printed, as well as from his own observations. Like Ortelius he, too, offered his charts in a handsome folio format, carefully engraved, and with the elegant typography and printing of Plantin. Waghenaer was the first in a long line of successful Dutch sea chart makers. In fact, one of the main contributions of the Dutch school of cartography was the commercialization of the map trade. The Dutch created an international market for map publishing and their prodigious output dominated the world market for the next 200 years.

Hendrik Doncker was a publisher and chart seller in Amsterdam who issued his atlases in Dutch, French and English editions. Apart from sea atlases, charts and pilot books, he also published various editions of textbooks on the art of naviga-

Paskaerte zynde t'Oosterdeel van Oost Indien, met alle de Eylanden daer ontrendt geleegen van C. Comorin tot aen Iapan from J. Robijn's *Zee, Zea - Atlas - Aquatique, del Mar* (Amsterdam, 1686).

HOLLANDIA
NOVA.
Tropicus Capricorni.

tion. Doncker's maps were the most accurate of those produced in the second half of the 17th century. His charts were original, not merely copies of existing maps, and the plates were continually corrected and revised in order to incorporate the latest geographical information. When the changes were extensive and the plates could no longer be revised, new plates were engraved and obsolete charts were replaced by the newer versions. Within a decade of its first appearance he had increased the number of charts in his atlas from 19 to 50. The Fisher Library copy of the 1666 edition has 32 charts dated between 1658 and 1666, and corresponds with "variant A" (Don 9A) in Cornelis Koeman's bibliography, *Atlantes Neerlandici*.

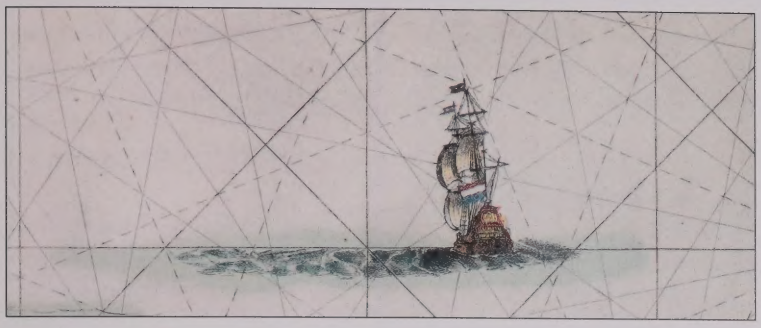
Jacobus Robijn was a map illuminator and chart seller. The first edition of his sea atlas in 1683 consisted of 19 charts, all bearing his name, with a world map by Nicolaes Visscher (1618-1679). Robijn acquired the charts of Pieter Goos (ca. 1616-1675) following his death, and most editions of the sea atlas dated 1683 or later contain a mixture of charts by Robijn and by Pieter Goos. Goos, in turn, had copied most of his charts from Doncker (see case 7 for an example of a Doncker map copied by Goos). The Fisher Library copy consists of the Robijn title page dated 1683, preliminary matter taken from Goos's sea atlas of 1666, 40 charts most of which are by Goos and are dated between 1666 and 1686, and a world map by Goos.

CASE THREE: *Engraved title pages and world maps from Doncker and Robijn atlases*

The elaborate illustrated title pages are typical of all Dutch sea atlases. The Doncker title page is divided into three panels, and includes illustrations of ships at sea, as well as depictions of allegorical figures holding astronomical and navigational instruments. The Robijn title page is designed in such a way that it supplies the title in Dutch, English, French and Spanish. Sea atlases followed a conventional formula and generally consist of an illustrated title page, brief preliminary text describing the various regions of the world covered in the charts, sometimes also with a history of navigation, an index or table of contents listing the charts, and the individual charts themselves which are generally preceded by a world map.

[Doncker]: *Nova Totius Terrarum Orbis Tabula* / auctore F. De Wit. t' Amsterdam: bij Frederick de Wit ..., 1660.
Engraved map, hand-coloured, 44 × 55 cm.

[Robijn]: *Orbis Terrarum Nova et Accuratissima Tabula* / auctore Petro Goos. Nieuwe Werelt Kaert uijt gegeven tot Amsterdam bij Pieter Goos, [1666]
Engraved map, hand-coloured, 44 × 54 cm.



The double hemisphere world maps which introduce the sea atlases are virtually identical in their coverage of the known world. Although the dates of issue of the Doncker and Robijn atlases are approximately 25 years apart, dates of the individual maps vary and often are much earlier than the date of publication of the atlas. In some cases, as here, the two versions of the map were created at almost the same time. The Doncker map is by Frederick De Wit, who produced atlases of geographical maps and also his own sea atlas in 1675 and 1680. The world map in the Robijn atlas is found in the first edition of Goos's *Zee-atlas* of 1666, but was evidently not used by Robijn in his own atlases until 1686. Copies of the Robijn 1683 atlas include the world map of Nicolaes Visscher instead of that of Goos.

Both maps show California as an island. Although the west coast of California was delineated as a continuous coastline in the earliest printed maps of America, the idea of California as an island is supposed to have orginated about 1620. After about 1638 maps of North America commonly show California as an island, an error perpetuated well into the 18th century.

CASE FOUR: *Charts of the Mediterranean*

[Doncker]: *Pas kaert van 't Oostelycke deel der Middelandsche Zee.* T'Amsterdam: by Hendrick Doncker ..., 1664.
Engraved map, hand-coloured, 41 × 51 cm.

[Robijn]: *Pas-Caart van de Middelandsche Zee, vertoonende in twee delen.* t'Amsterdam: by Pieter Goos ..., 1673.
2 engraved maps on 1 sheet, hand-coloured, ea. 23 × 55 cm.

Doncker's chart of the Mediterranean is given on two sheets - one for the western (not shown) and one for the eastern portions, while Goos's chart in the Robijn atlas sandwiches both views onto one sheet. Doncker's is therefore on a slightly larger scale, but the maps are otherwise very similar. Both maps include

a list of places of interest to navigators, such as islands, 'hoeken' (peninsulas) and harbours which are keyed to numbers on the map. Doncker lists 111 place names in his table for the eastern Mediterranean, while the Robijn map lists 97.

CASE FIVE: *The west coast of Africa*

[Doncker]: *Paskaart van Guinea van C. Verde tot R. de Galion.* t'Amsterdam: Bij Hendrick Doncker ..., [1665]
Engraved map, hand-coloured, 43 × 54 cm.

[Doncker]: *Pascaart van de Zee-custen van Angola, en Cimbehas van Rivier de Galion tot C. de Bona Esperanca.* tAmsterdam: By Hendrick Doncker ..., 1659.
Engraved map, hand-coloured, 43 × 54 cm.

Doncker's chart of the west coast of Africa is presented on three sheets corresponding to the three major phases of exploration of this coast - from Gibraltar to C. Verde (not shown), from C. Verde to R. de Galion (Gabon River) and from R. de Galion to the Cape of Good Hope. Like the majority of sea charts, these are oriented landward, imitating the mariner's view of the coast, rather than the more familiar orientation with north at the top which is conventionally found on land maps.

CASE SIX: *East Indies*

[Doncker]: *'t Ooster Deel van Oost Indien, streckende van Ceylon tot Iapan en Hollandia Nova.* T'Amsterdam: Bij Hendrick Doncker ..., [1663]
Engraved map, hand-coloured, 60 × 45 cm.

[Robijn]: *Paskaerte zynde t'Oosterdeel van Oost Indien, met alle de Eylanden daer ontrendt geleegen van C. Comorin tot aen Iapan.* t'Amsterdam: by Pieter Goos ..., [1666]
Engraved map, hand-coloured, 45 × 55 cm.

The Doncker map is oriented to the north, while the Robijn map is oriented to the east. The Robijn map is on a smaller scale and covers a somewhat larger area, including the southern part of India and Ceylon, while Doncker shows only the area to the east of Bengal. Both maps show a break in the west coast of Hollandia Nova (Australia), indicating the coastline is uncharted, and include the same notes on exploration. However, there are significant differences in the outline of Japan, China and Korea. It was Dutch navigators such as Abel Tasman who were responsible for the first authentic information on Australia.

CASE SEVEN: *North Atlantic, approaching Europe from the west*

[Doncker]: *Pas Caert van't in komen van de Canael; hoe men die sal aen doen als men uyt de West komt.* t' Amsterdam: Bij Hendrick Doncker ..., 1661.
Engraved map, hand-coloured, 43 × 53 cm.

[Robijn]: *Paskaerte van't in comen van't Canaal, hoemen dat sal aen doen, als men uyt de West comt.* t'Amsteldam: bij Pieter Goos, [1666]
Engraved map, hand-coloured, 45 × 55 cm.

This map of the North Atlantic looking east towards Great Britain and continental Europe is a striking example of the way in which Pieter Goos copied Doncker's map for his own atlas. The chart came to Robijn after Goos's death in 1675. The titles, although they exhibit the commonly found variations in spelling, are identically worded. The ornamentation and title cartouche are not the same, and are positioned differently on the plate, but the actual coastal outlines are identical. Place names vary only slightly, and a similar style of place name engraving has been adopted. The companion plates to this one (not shown), which show the North Atlantic from the other direction, looking west from land, are so similar that they look as if they could have been printed from the same plate.

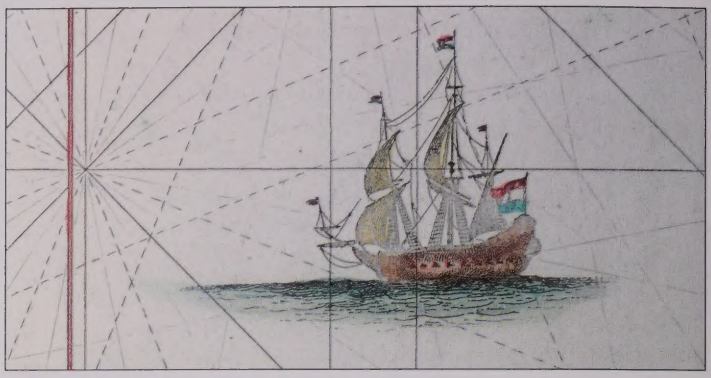
CASE EIGHT: *Dutch North America*

[Doncker]: *Pascaert van Nieu Nederland, Virginia en Nieu Engelant* ... T'Amsterdam: Bij Hendrick Doncker ..., 1660.
Engraved map, hand-coloured, 45 × 55 cm.

[Robijn]: *Pas caerte van Nieu Nederlandt en de Engelsche Virginies van Cabo Cod tot Cabo Canrick.* [1666]
Engraved map, hand-coloured, 45 × 55 cm.

Although Robijn's map was published only six years later than Doncker's, it shows considerably more detail in its depiction of the eastern seaboard, in particular in the Long Island and Chesepeake Bay areas.

The exhibition continues in the Reading Room on the first level, with additional plates from the Doncker and Robijn atlases.



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Cover illustration: top and bottom panels from the engraved title page to Donker's *Zee - Atlas* (Amsterdam, 1660)